

Title: Pepe's Problematic Pizzeria

Brief Overview:

This lesson introduces the concepts of patterns and functions by completing and writing rules for one-operation function tables.

During this unit, each student will work to assist the restaurant manager, Pepe, in the preparation of dinner service. Students will be presented with a series of tasks that require them to use their knowledge and application of patterns and one-operation function tables.

NCTM Content Standard/National Science Education Standard:

Understand patterns, relations, and functions:

- Represent and analyze patterns and functions, using words, tables, and graphs

Grade/Level:

Grade 4

Duration/Length:

Three class sessions, approximately 60 minutes per session

Student Outcomes:

Students will:

- Complete a function table using one-operation
- Describe the relationship that generates a one-operation rule

Materials and Resources:

Day 1

- Cooking apron, chef's hat, pizza pan, pizza box (items that may be used or placed on display to capture students attention and enjoy the 3-day theme)
- Transparency of Teacher Resource 1A and 1B (1 copy for teacher)
- Dry erase boards (1 for each student)
- Dry erase markers (1 for each student)
- *Two of Everything* by Lilly Toy Hong ISBN: 0-8075-8157-7 (1 book for teacher)
- "Magic Oven"Function Box (1 box for teacher)
 - Teacher Resource 2 "Magic Oven Function Box Graphic" (1 copy for teacher)
 - See <http://www.uen.org/Lessonplan/preview.cgi?LPid=18873> for directions to make a Function box. Click on "Function Box.pdf"

- Any variation of the function box will work (i.e. shoe box, cereal box, or kettle/pot)
- 20 index cards (approximately)
- Student Resource 1A-B “Function Flip” function cards and number cards (1 set cut out for every pair of students) *Copy function cards and number cards in different colors.
- Student Resource 2 “Pizza Slices” (1 set or as many as needed cut out for teacher)
- Student Resource 3 “Pepe Needs Your Help” (1 copy for each student)
- Teacher Resource 3 “Pepe Needs Your Help” Answer Key (1 copy for teacher)

Day 2

- Student Resource 4 “Pepe Prepares Pizzas” (cut, 1 half sheet for each student)
- Student Resource 5 Operation Pinch Cards (cut, 1 half sheet for each student)
- Dry erase board (1 for each student)
- Dry erase marker (1 for each student)
- Student Resource 6A- H “Solve and Switch” (1 set cut out)
- Student Resource 7 “Solve and Switch Enrichment” (1 copy for each student as needed)
- Student Resource 8 “Pepe’s Desserts” (1 copy for each student)
- Teacher Resource 4 “Pepe’s Desserts” Answer Key (1 copy for teacher)

Day 3

- Student Resource 6A-H “Solve and Switch” (1 set cut out from Day 2)
- Student Resource 9 “Time it Takes Pepe to Make Pizzas” (1 transparency OR 1 copy for each student)
- Student Resource 10A-D Missing Inputs Function Table
- Student Resource 11A-B “Sloppy Sauce Solutions”
- Teacher Resource 5A-B “Sloppy Sauce Solutions” Answer Key
- Student Resource 12A-B Summative Assessment
- Teacher Resource 6A-B Summative Assessment Answer Key (1 copy for teacher)

Development/Procedures:

Day 1

- Pre-assessment

Make a transparency of Teacher Resource 1A and 1B and ask the students to write their answers on individual-sized dry erase and hold up their responses when prompted. Prompt the students to first identify the missing number, then prompt the students to identify the rule for the function table.

Answers:

1. Missing Number: 12; Rule: $x + 1$
2. Missing Number: 6; Rule: $n - 2$
3. Missing Number: 9. Rule $n \times 3$
4. Missing Number: 5; Rule $n \div 5$

- Engagement
Read the book, *Two of Everything*, to the students to introduce the concept of patterns and function tables. If time is limited, read at least through the first 7 pages. Ask students to consider what happens each time an item is placed in the pot.
- Exploration
Tell the students that they have a job as an assistant to the restaurant manager at Pepe's Pizza. Pepe, the head manager, has several things to do to get ready for dinner service. Students will have the responsibility to help Pete solve his problems using their new knowledge and understanding of function tables.
Example Function Card:

(front)	(back)
Input	Output
3	5

Present the class with the “Magic Oven” function box (Teacher Resource 2). Display the input card to the students to demonstrate that when an input card (the front) is inserted into the function box, the output card (the back) is produced. Display the output for the students. Following the theme of restaurant and food, you present the problem as, “If I put 3 pizzas into the “Magic Oven” and 5 pizzas come out, what is happening in the oven?”

Make 4 more input/output cards that follow the same rule of adding 2

- Input: 42 Output: 44; Input: 67 Output: 69; Input: 19 Output: 21; Input: 53 Output: 55
 - When showing the fifth input card, show the input (53) and ask the students to work in groups to predict the output that follows the same rule.
 - Provide ample time for the students to discuss their ideas with their group members.
 - Ask students to share their predictions and explain their thinking.
- Explanation
Call on a group to share their thoughts and explain how or why they know their output is correct. Ask students what the rule is that helped them determine the output number. Ask groups to create their own input/output numbers that follow

the same rule. Provide time to share and discuss responses with explanations. Invite other groups to share their thoughts and facilitate a class discussion.

Continue to explore the idea of the “Magic Oven” function machine with other rules and examples. Repeat the activity using other rules. Be sure to include at least 3 input/outputs to provide ample information for students to determine a rule.

Make index cards that follow other rules. Consider using the following rules:

- $x - 8$
- $x + 10$
- $x - 100$
- $x + 25$

As input/outputs are revealed, record the information on a function table on the chalkboard. Draw a function table template on the board and complete as each rule is worked out as a class. Be sure to include and model both vertical and horizontal templates.

Input	Output

What is the rule?

Input	
Output	

What is the rule?

○ Application

Students work in pairs to play “Function Flip” Student Resource 1A and 1B. Each pair needs a set of function cards and a set of number cards. Model one turn for the class before beginning the game.

Rules:

- Make two piles of cards: one pile of function cards and one pile of number cards (input). *Input cards and output cards should be copied on different colored paper.
- Player 1 flips over the top function card and the top number card (input).
- The first player to identify the output for the given input and function wins the round and takes the cards.

- Player 2 takes a turn flipping the function and number cards and game continues until all functions and inputs have been played or until you call time.
- The player with the most cards is the winner.
- Differentiation
 - Reteach

For students who are struggling with the numerical representation of input/outputs, use Student Resource 2 “Pizza Slices” for hands-on manipulatives. Provide the students with examples of input and outputs and ask them to determine the rule. If students are successful, ask them to come up with their own input and output that follow the same rule. (Note: Use smaller numbers with only addition and subtraction rules.)

Suggested rules:

 - $x - 1$
 - $x + 4$
 - $x - 3$
 - $x + 2$
 - Enrich

Have students play “Function Flip” but instead of drawing a number card that is the input, draw a number card that is the output. Students are required to identify the input that would work with the output and rule. Some output and rule pairings will result in a negative input. Tell students to either draw another card so that there is no negative input value or remove cards that may result in a negative input before playing.
- Assessment

Distribute Student Resource 3 “Pepe Needs Your Help”. Students are asked to help Pepe solve two problems by using a rule to complete a function table. See Teacher Resource 3 “Pepe Needs Your Help” for the answer key.

Day 2

- Engagement

Students individually complete Student Resource 4, “Pepe Prepares Pizzas” to review function tables from the day before. Review the answers together (K: 82, 1st: 95, 2nd: 88, 3rd: 106)
- Exploration

Using the Magic Oven Function box from Day 1, present students with input/output cards that utilize multiplication and division rules.

Example Function Card:

(front)	(back)
Input	Output
3	15

Make 4 more input/output cards that follow the same rule of multiplying by 5

- Input: 3 Output: 15
- Input: 7 Output: 35
- Input: 4 Output: 20
- Input: 10 Output: 50

Show the fifth input card (10). Ask the students to work in groups to predict the output that follows the same rule. Provide ample time for the students to discuss their ideas with their group members. Ask students to share their predictions and explain their thinking.

○ Explanation

Call on a group to share their thoughts and explain how or why they know their output is correct. Ask students what the rule is that helped them determine their output. Ask groups to create their own input/output numbers that follow the same rule. Provide time to share and discuss responses with explanations. Invite other groups to share their thoughts and facilitate a class discussion.

- Ask: What do you notice about the output when the rule is multiplication of whole numbers? (The output is always greater than the input.)
- Why do you think this so? (A product of two whole numbers is always equal to or greater than the two factors.)
- How can you relate this to the examples we did yesterday? (Multiplication is similar to addition because the outputs are always greater than the inputs when whole numbers are used.)
- Predict what the output will be compared to the input when a division rule is used with whole numbers? (The output will be less than the input.)
- How can you relate this to the examples we did yesterday? (Division is similar to subtraction because the outputs in our examples are less than the inputs.)

Continue to explore the idea of the “Magic Oven” function machine with other rules and examples. Repeat the activity using other rules. Be sure to include at least 3 input/outputs to provide ample data so that students can determine a rule.

Make index cards that follow other rules. Consider using the following rules:

- $n \times 8$
- $n \div 10$
- $n \times 100$

$$n \div 4$$

As input/outputs are revealed, record the information on a function table on the chalkboard.

Draw a function table template on the board and complete as each rule is worked out as a class. Be sure to include and model both vertical and horizontal templates.

<u>Input</u>	<u>Output</u>

What is the rule?

<u>Input</u>	
<u>Output</u>	

What is the rule?

Prepare Student Resource 5 by copying on cardstock and cutting in half vertically. Distribute one pinch card, dry erase board, and dry erase marker to each student. Draw a function table on the chalkboard or chart paper and write the first input and output on the table.

<u>Input</u>	<u>Output</u>
2	6

Say: Using your pinch card, show me an operation that could possibly be used in the rule for this input and output (Answers: Addition or Multiplication). Discuss with students that there needs to be more inputs and outputs in order to determine a rule. Say: What is it about the relationship of the input (2) and output (6) that tells you the rule could involve addition or multiplication? (The output is greater than the input.)

- Application

Fill in the next input/output on the same table.

<u>Input</u>	<u>Output</u>
2	6
3	7

Say: Now that you have more information, use your pinch card to show an operation that could be used to make a rule. (*Addition*)

Say: For those of you who thought the first input and output followed a multiplication rule, what made you change your mind? (Multiplication works for $2 \times 3 = 6$ but you can't use the same rule to multiply by 3 for the input of 3 and output of 7.)

Add one more input to the same function table.

<u>Input</u>	<u>Output</u>
2	6
3	7
58	

Use the same rule and find the output when the input is 58. Write your answer on your whiteboard. (62) Invite students to choose their own input and apply the same rule to find the output and show it on their dry erase boards.

Draw another function table on the chalkboard or chart paper and write the first input and output on the table.

<u>Input</u>	<u>Output</u>
40	5

Say: Using your pinch card, show an operation that could possibly be used for the rule for this set of input/output. (Possible Answers: Subtraction or Division)
Discuss with students that there needs to be more inputs and outputs in order to

determine a rule. Say: What is it about the relationship of the input (40) and output (5) that tells you the rule could involve subtraction or division? (The output is less than the input.)

Fill in the next input/output on the same table.

Input	Output
40	5
32	4

Say: Now that you have more information, use your pinch card to show an operation that could be used in the rule (Division). Say: For those of you who thought with the first input and output followed a subtraction rule, what made you change your mind? (Subtraction works for $40 - 35 = 5$ but you can't use the same rule subtract 35 for the input of 32 and output of 4.) Invite students to choose their own input and apply the same rule to find the output. Ask for students to write their answer on their dry erase boards and share.

Prepare Student Resources 6A-H, "Solve and Switch" game by cutting on the dotted lines and folding on the solid lines. Distribute at least one game card to each student. Have students stand and pair up with a classmate. Partner #1 holds up the function table and partner #2 answers the missing outputs and identifies the rule. Partner #1 checks the answer found on the back of the card. After both students have answered the other's card, the students trade cards and pair up with someone else in the classroom. Students continue to circulate and answer other students' cards. Monitor students to determine which students would benefit from reteaching or enrichment.

- Differentiation

- Reteach

Pull students who struggled with the Solve and Switch game to a small group. Using the same Solve and Switch game cards one at a time, discuss with students how to first identify the rule by noting whether the outputs are greater than or less than the inputs. Model for students a "think aloud" about how to guess and check for the rule. Once the rule is determined, apply the rule to each of the missing outputs to answer the card.

After completing a few examples as a group, invite students to work with partners within that group to give more guided practice to answer a card. As students become more successful, invite students to work independently to answer a few cards.

- Enrich

Pull students who have demonstrated an excellent understanding and have successfully applied their knowledge of function tables and rule identification throughout the lesson and successfully answered other students' cards during the Solve and Switch game. Distribute Student Resource 7 "Solve and Switch Enrichment," which requires students to create and complete their own function tables and create rules. Complete cards can be collected and used the following day as the Engagement.
- Website for online practice (Optional):

Function Machine Practice: Students can identify the input, output, or rule for given problems. Geared towards 3rd/4th grades.

http://teams.lacoe.edu/documentation/classrooms/amy/algebra/34/activities/functionmachine/functionmachine3_4.html
- Assessment

Distribute Student Resource 8, "Pepe's Desserts". Students are asked to help Pepe solve two problems by using a rule to complete a function table. See Teacher Resource 4 "Pepe's Desserts" for the answer key.

Day 3

- Engagement

Distribute the Solve and Switch cards from Day 2. Include student-created Solve and Switch cards from enrichment activity if appropriate.
- Exploration

Explain to students that Pepe carelessly spilled tomato sauce all over his function tables and has lost some of his information. Several inputs in his table have become illegible and he needs the students' help in completing the table so that his restaurant can run smoothly.

Display (or distribute) Student Resource 9, "Time it Takes Pepe to Make Pizzas." Say: Discuss with your partner how you can figure out what the missing numbers are. What is the rule? How do you know? Ask groups to share how they found the missing numbers (8,14).
- Explanation

Use the Magic Oven Function Box to show the four inputs and outputs that follow a rule (Student Resource 10A). *All cards with the letter A on it follow the same rule. All cards with the letter B follow the same rule...etc.)

 1. Show the input before placing it in the box and display the output as it comes out.
 2. Decide which operation is used to make a rule.
 3. Determine the rule for the table.

4. One of the input/output cards is missing an input. Explain to the students the process to find the missing input. Find the missing input by using the inverse operation of the rule. Example: What number when multiplied by 4 is 36? 9.

Continue the activity for each of the 4 rules (Student Resource 10B-D).

○ Application

Say: Pepe has many function tables that got messy with tomato sauce and once again needs your help. Display transparency of Student Resource 11A-B, Sloppy Sauce Solutions. Students work in partners and use a dry erase board to display their answers. See Teacher Resource 5A-B Sloppy Sauce Solutions Answer Key.

○ Differentiation

▪ Reteach

For students who are struggling with the numerical representation of inputs and outputs, use Student Resource 2, “Pizza Slices” as hands-on manipulatives. Provide the students the first 3 input/outputs following a rule, and ask them to find the missing input with the given output.

Manipulate the pizza slices to show how the rule works to find missing inputs and outputs. By moving the pizza slices, students may be able to check and guess their work with the visual representation.

Input	Output
2	1
3	2
5	

Suggested rules:

- $x - 1$
- $x + 4$
- $x - 3$
- $x + 2$

▪ Enrich

Ableweb Function Machine

(<http://www.amblesideprimary.com/ableweb/mentalmaths/functionmachines.html>) Allow students to select one or two step operations (above grade level). With one operation, students can choose to double, halve, add a single digit number, etc. During the game, students choose an input and use the rule to predict the output. Students can check their work and receive feedback.

*Teacher should choose appropriate level based on student ability.

Summative Assessment:

The students will be presented with three restaurant related questions to assess their understanding of function tables and rules. Distribute Resource 12A-B, Hamburger Heaven Needs Help. Students will identify a missing output, rule, and missing input within the context of multiple choice, fill in the blank, and BCR questions. See Teacher Resource 6A-B Summative Assessment for the answer key.

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“Function Flip”
Function Cards

$x + 5$	$x - 10$
$x + 20$	$x - 15$
$x + 100$	$x - 50$
$x + 2$	$x - 5$
$x + 4$	$x - 20$
$x + 11$	$x - 2$

“Function Flip”
Number Cards

60	300
80	100
90	65
120	75
200	150
70	250

Pizza Slices



Pepe Needs Your Help!

Name _____

1. Pepe offers "Five Dollars Off Fridays" for each check total. Calculate the new check totals after the discount is applied on the function table below.

Rule: Subtract 5

Check Total	Check Total with Discount
\$45	
\$51	
\$57	
\$67	

2. Pepe always serves three more breadsticks than the number of customers seated at a table. Calculate the number of breadsticks needed for customer groups on the function table below.

Rule: Add 3

Number of Customers	Number of Breadsticks
7	
9	
10	
13	

Pepe Prepares Pizzas!



Name _____

Pepe is making pizza for your school. He is making personal pan pizzas for each student in every class. He wants to be sure there are enough pizzas, so he plans to make 4 extra pizzas for each grade level.

What rule should Pepe use in his function table? _____

Use the rule to complete Pepe's function table.

Number of students by grade level	(K)	(1 st)	(2 nd)	(3 rd)
	78	91	84	102
Number of pizzas Pepe should make				

Pepe Prepares Pizzas!



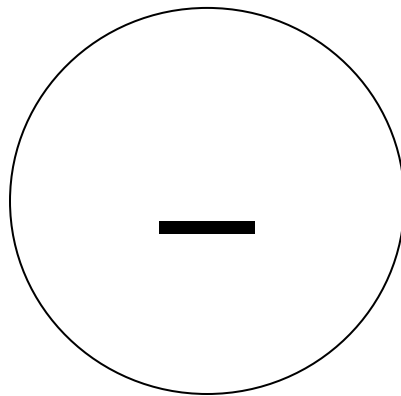
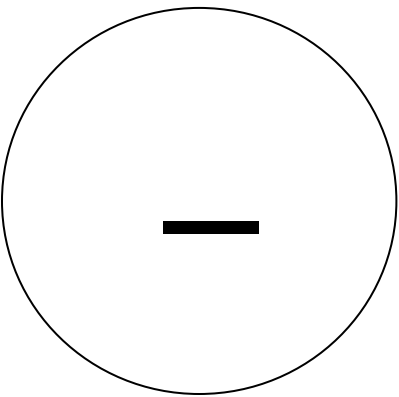
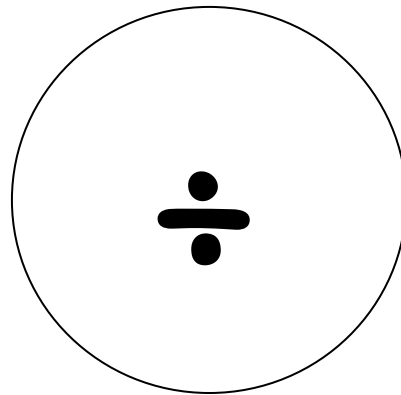
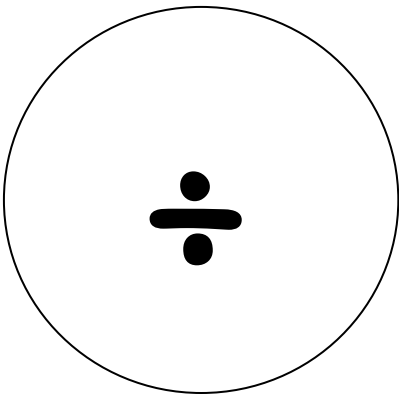
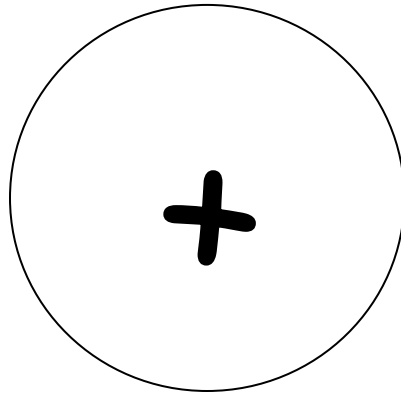
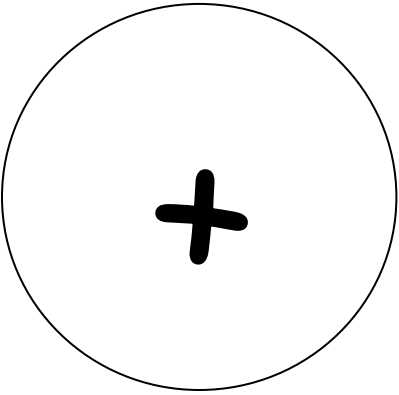
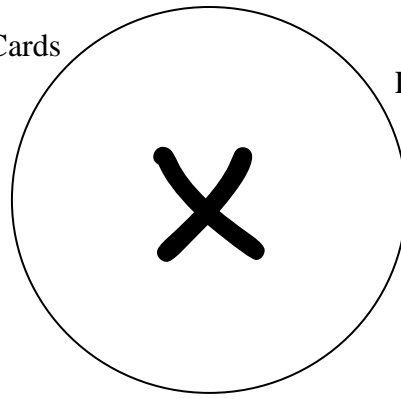
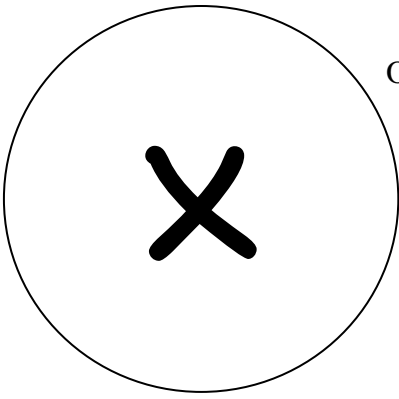
Name _____

Pepe is making pizza for your school. He is making personal pan pizzas for each student in every class. He wants to be sure there are enough pizzas, so he plans to make 4 extra pizzas for each grade level.

What rule should Pepe use in his function table? _____

Use the rule to complete Pepe's function table.

Number of students by grade level	(K)	(1 st)	(2 nd)	(3 rd)
	78	91	84	102
Number of pizzas Pepe should make				



Solve and Switch

Directions: Cut out each card on the dotted line then fold on the solid line. Students start with the

Solve

<u>Input</u>	<u>Output</u>
5	10
7	14
8	16
10	
14	
20	

A

20; 28; 40
Rule = Multiply by 2

Solve

<u>Input</u>	<u>Output</u>
3	9
5	15
6	18
8	
10	
12	

B

24; 30; 36
Rule = Multiply by 3

Solve

<u>Input</u>	<u>Output</u>
1	6
3	18
5	30
6	
8	
9	

C

36; 48; 54
Rule = Multiply by 6

Solve

<u>Input</u>	<u>Output</u>
2	10
3	15
6	30
7	
9	
10	

D

35; 45; 50
Rule = Multiply by 5

solve side of the card and refer to the opposite side for the answers.

Solve and Switch

Directions: Cut out each card on the dotted line then fold on the solid line. Students start with the solve side of the card and refer to the opposite side for the answers.

<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr><td>2</td><td>8</td></tr> <tr><td>4</td><td>16</td></tr> <tr><td>5</td><td>20</td></tr> <tr><td>6</td><td></td></tr> <tr><td>7</td><td></td></tr> <tr><td>9</td><td></td></tr> </tbody> </table> <p>E</p>	Input	Output	2	8	4	16	5	20	6		7		9		<p>24; 28; 36 Rule = Multiply by 4</p>
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Solve and Switch

Directions: Cut out each card on the dotted line then fold on the solid line. Students start with the solve side of the card and refer to the opposite side for the answers.

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27															
30															
<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>8</td> <td>2</td> </tr> <tr> <td>16</td> <td>4</td> </tr> <tr> <td>20</td> <td>5</td> </tr> <tr> <td>24</td> <td></td> </tr> <tr> <td>28</td> <td></td> </tr> <tr> <td>36</td> <td></td> </tr> </tbody> </table> <p>K</p>	Input	Output	8	2	16	4	20	5	24		28		36		<p>6; 7; 9</p> <p>Rule = Divide by 4</p>
Input	Output														
8	2														
16	4														
20	5														
24															
28															
36															
<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>15</td> <td>3</td> </tr> <tr> <td>20</td> <td>4</td> </tr> <tr> <td>25</td> <td>5</td> </tr> <tr> <td>30</td> <td></td> </tr> <tr> <td>40</td> <td></td> </tr> <tr> <td>45</td> <td></td> </tr> </tbody> </table> <p>L</p>	Input	Output	15	3	20	4	25	5	30		40		45		<p>6; 8; 9</p> <p>Rule = Divide by 5</p>
Input	Output														
15	3														
20	4														
25	5														
30															
40															
45															

Solve and Switch

Directions: Cut out each card on the dotted line then fold on the solid line. Students start with the solve side of the card and refer to the opposite side for the answers.

<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>12</td> <td>2</td> </tr> <tr> <td>18</td> <td>3</td> </tr> <tr> <td>24</td> <td>14</td> </tr> <tr> <td>36</td> <td></td> </tr> <tr> <td>42</td> <td></td> </tr> <tr> <td>60</td> <td></td> </tr> </tbody> </table>	Input	Output	12	2	18	3	24	14	36		42		60		<p>6; 7; 10</p> <p>Rule = Divide by 6</p>
Input	Output														
12	2														
18	3														
24	14														
36															
42															
60															
<p>M</p> <p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>7</td> <td>1</td> </tr> <tr> <td>21</td> <td>3</td> </tr> <tr> <td>28</td> <td>4</td> </tr> <tr> <td>35</td> <td></td> </tr> <tr> <td>56</td> <td></td> </tr> <tr> <td>63</td> <td></td> </tr> </tbody> </table>	Input	Output	7	1	21	3	28	4	35		56		63		<p>7; 8; 9</p> <p>Rule = Divide by 7</p>
Input	Output														
7	1														
21	3														
28	4														
35															
56															
63															
<p>N</p> <p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>16</td> <td>2</td> </tr> <tr> <td>24</td> <td>3</td> </tr> <tr> <td>32</td> <td>4</td> </tr> <tr> <td>40</td> <td></td> </tr> <tr> <td>48</td> <td></td> </tr> <tr> <td>64</td> <td></td> </tr> </tbody> </table>	Input	Output	16	2	24	3	32	4	40		48		64		<p>5; 6; 8</p> <p>Rule = Divide by 8</p>
Input	Output														
16	2														
24	3														
32	4														
40															
48															
64															
<p>O</p> <p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>9</td> <td>1</td> </tr> <tr> <td>18</td> <td>2</td> </tr> <tr> <td>27</td> <td>3</td> </tr> <tr> <td>36</td> <td></td> </tr> <tr> <td>45</td> <td></td> </tr> <tr> <td>72</td> <td></td> </tr> </tbody> </table>	Input	Output	9	1	18	2	27	3	36		45		72		<p>4; 5; 8</p> <p>Rule = Divide by 9</p>
Input	Output														
9	1														
18	2														
27	3														
36															
45															
72															
P															

Solve and Switch

Directions: Cut out each card on the dotted line then fold on the solid line. Students start with the solve side of the card and refer to the opposite side for the answers.

<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>12</td> <td>14</td> </tr> <tr> <td>35</td> <td>37</td> </tr> <tr> <td>42</td> <td>44</td> </tr> <tr> <td>55</td> <td></td> </tr> <tr> <td>61</td> <td></td> </tr> <tr> <td>79</td> <td></td> </tr> </tbody> </table> <p>Q</p>	Input	Output	12	14	35	37	42	44	55		61		79		<p>57; 63; 81 Rule = Add 2</p>
Input	Output														
12	14														
35	37														
42	44														
55															
61															
79															
<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>23</td> <td>33</td> </tr> <tr> <td>46</td> <td>56</td> </tr> <tr> <td>47</td> <td>57</td> </tr> <tr> <td>62</td> <td></td> </tr> <tr> <td>85</td> <td></td> </tr> <tr> <td>93</td> <td></td> </tr> </tbody> </table> <p>R</p>	Input	Output	23	33	46	56	47	57	62		85		93		<p>72; 95; 103 Rule = Add 10</p>
Input	Output														
23	33														
46	56														
47	57														
62															
85															
93															
<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>25</td> <td>50</td> </tr> <tr> <td>50</td> <td>75</td> </tr> <tr> <td>100</td> <td>125</td> </tr> <tr> <td>200</td> <td></td> </tr> <tr> <td>225</td> <td></td> </tr> <tr> <td>250</td> <td></td> </tr> </tbody> </table> <p>S</p>	Input	Output	25	50	50	75	100	125	200		225		250		<p>225; 250; 275 Rule = Add 25</p>
Input	Output														
25	50														
50	75														
100	125														
200															
225															
250															
<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>25</td> <td>75</td> </tr> <tr> <td>50</td> <td>100</td> </tr> <tr> <td>75</td> <td>125</td> </tr> <tr> <td>100</td> <td></td> </tr> <tr> <td>125</td> <td></td> </tr> <tr> <td>200</td> <td></td> </tr> </tbody> </table> <p>T</p>	Input	Output	25	75	50	100	75	125	100		125		200		<p>150; 175; 250 Rule = Add 50</p>
Input	Output														
25	75														
50	100														
75	125														
100															
125															
200															

Solve and Switch

Directions: Cut out each card on the dotted line then fold on the solid line. Students start with the solve side of the card and refer to the opposite side for the answers.

<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>8</td> </tr> <tr> <td>17</td> <td>22</td> </tr> <tr> <td>25</td> <td>30</td> </tr> <tr> <td>34</td> <td></td> </tr> <tr> <td>45</td> <td></td> </tr> <tr> <td>71</td> <td></td> </tr> </tbody> </table> <p>U</p>	Input	Output	3	8	17	22	25	30	34		45		71		<p>39; 50; 76</p> <p>Rule = Add 5</p>
Input	Output														
3	8														
17	22														
25	30														
34															
45															
71															
<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>12</td> </tr> <tr> <td>7</td> <td>14</td> </tr> <tr> <td>10</td> <td>17</td> </tr> <tr> <td>12</td> <td></td> </tr> <tr> <td>20</td> <td></td> </tr> <tr> <td>45</td> <td></td> </tr> </tbody> </table> <p>V</p>	Input	Output	5	12	7	14	10	17	12		20		45		<p>19; 27; 52</p> <p>Rule = Add 7</p>
Input	Output														
5	12														
7	14														
10	17														
12															
20															
45															
<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>25</td> <td>45</td> </tr> <tr> <td>37</td> <td>57</td> </tr> <tr> <td>40</td> <td>60</td> </tr> <tr> <td>72</td> <td></td> </tr> <tr> <td>80</td> <td></td> </tr> <tr> <td>101</td> <td></td> </tr> </tbody> </table> <p>W</p>	Input	Output	25	45	37	57	40	60	72		80		101		<p>92; 100; 121</p> <p>Rule = Add 20</p>
Input	Output														
25	45														
37	57														
40	60														
72															
80															
101															
<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>38</td> <td>238</td> </tr> <tr> <td>74</td> <td>274</td> </tr> <tr> <td>125</td> <td>325</td> </tr> <tr> <td>205</td> <td></td> </tr> <tr> <td>350</td> <td></td> </tr> <tr> <td>379</td> <td></td> </tr> </tbody> </table> <p>X</p>	Input	Output	38	238	74	274	125	325	205		350		379		<p>405; 550; 579</p> <p>Rule = Add 200</p>
Input	Output														
38	238														
74	274														
125	325														
205															
350															
379															

Solve and Switch

Directions: Cut out each card on the dotted line then fold on the solid line. Students start with the solve side of the card and refer to the opposite side for the answers.

<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>15</td> <td>12</td> </tr> <tr> <td>19</td> <td>16</td> </tr> <tr> <td>46</td> <td>43</td> </tr> <tr> <td>55</td> <td></td> </tr> <tr> <td>67</td> <td></td> </tr> <tr> <td>90</td> <td></td> </tr> </tbody> </table> <p>Y</p>	Input	Output	15	12	19	16	46	43	55		67		90		<p>52; 64; 87</p> <p>Rule = Subtract 3</p>
Input	Output														
15	12														
19	16														
46	43														
55															
67															
90															
<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>17</td> <td>13</td> </tr> <tr> <td>20</td> <td>16</td> </tr> <tr> <td>49</td> <td>45</td> </tr> <tr> <td>58</td> <td></td> </tr> <tr> <td>61</td> <td></td> </tr> <tr> <td>88</td> <td></td> </tr> </tbody> </table> <p>Z</p>	Input	Output	17	13	20	16	49	45	58		61		88		<p>54; 57; 84</p> <p>Rule = Subtract 4</p>
Input	Output														
17	13														
20	16														
49	45														
58															
61															
88															
<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>11</td> <td>6</td> </tr> <tr> <td>24</td> <td>19</td> </tr> <tr> <td>30</td> <td>25</td> </tr> <tr> <td>51</td> <td></td> </tr> <tr> <td>75</td> <td></td> </tr> <tr> <td>100</td> <td></td> </tr> </tbody> </table> <p>AA</p>	Input	Output	11	6	24	19	30	25	51		75		100		<p>46; 70; 95</p> <p>Rule = Subtract 5</p>
Input	Output														
11	6														
24	19														
30	25														
51															
75															
100															
<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>1</td> </tr> <tr> <td>14</td> <td>5</td> </tr> <tr> <td>22</td> <td>13</td> </tr> <tr> <td>32</td> <td></td> </tr> <tr> <td>44</td> <td></td> </tr> <tr> <td>65</td> <td></td> </tr> </tbody> </table> <p>BB</p>	Input	Output	10	1	14	5	22	13	32		44		65		<p>23; 35; 56</p> <p>Rule = Subtract 9</p>
Input	Output														
10	1														
14	5														
22	13														
32															
44															
65															

Solve and Switch

Directions: Cut out each card on the dotted line then fold on the solid line. Students start with the solve side of the card and refer to the opposite side for the answers.

<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>48</td> <td>38</td> </tr> <tr> <td>127</td> <td>117</td> </tr> <tr> <td>165</td> <td>155</td> </tr> <tr> <td>290</td> <td></td> </tr> <tr> <td>310</td> <td></td> </tr> <tr> <td>700</td> <td></td> </tr> </tbody> </table>	Input	Output	48	38	127	117	165	155	290		310		700		<p>280; 300; 690</p> <p>Rule = Subtract 10</p>
Input	Output														
48	38														
127	117														
165	155														
290															
310															
700															
<p>CC</p> <p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>58</td> <td>28</td> </tr> <tr> <td>60</td> <td>30</td> </tr> <tr> <td>76</td> <td>46</td> </tr> <tr> <td>100</td> <td></td> </tr> <tr> <td>143</td> <td></td> </tr> <tr> <td>230</td> <td></td> </tr> </tbody> </table>	Input	Output	58	28	60	30	76	46	100		143		230		<p>70; 113; 200</p> <p>Rule = Subtract 30</p>
Input	Output														
58	28														
60	30														
76	46														
100															
143															
230															
<p>DD</p> <p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>60</td> <td>10</td> </tr> <tr> <td>100</td> <td>50</td> </tr> <tr> <td>177</td> <td>127</td> </tr> <tr> <td>225</td> <td></td> </tr> <tr> <td>350</td> <td></td> </tr> <tr> <td>460</td> <td></td> </tr> </tbody> </table>	Input	Output	60	10	100	50	177	127	225		350		460		<p>175; 300; 410</p> <p>Rule = Subtract 50</p>
Input	Output														
60	10														
100	50														
177	127														
225															
350															
460															
<p>EE</p> <p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>286</td> <td>186</td> </tr> <tr> <td>351</td> <td>251</td> </tr> <tr> <td>465</td> <td>365</td> </tr> <tr> <td>598</td> <td></td> </tr> <tr> <td>609</td> <td></td> </tr> <tr> <td>894</td> <td></td> </tr> </tbody> </table>	Input	Output	286	186	351	251	465	365	598		609		894		<p>498; 509; 794</p> <p>Rule = Subtract 100</p>
Input	Output														
286	186														
351	251														
465	365														
598															
609															
894															
FF															

Solve and Switch Enrichment

Directions: Cut out each card on the dotted line then fold on the solid line. Students start with the solve side of the card and refer to the opposite side for the answers.

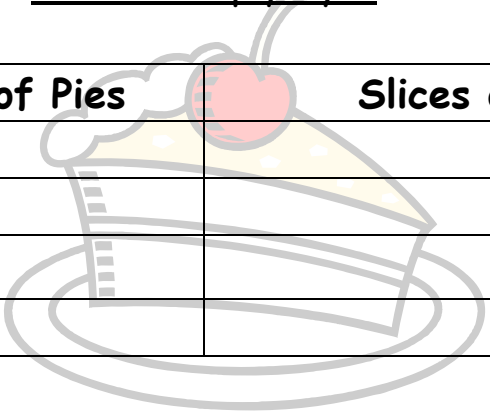
<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> </tbody> </table> <p>A</p>	Input	Output			<p>_____ ; _____ ; _____</p> <p>Rule = _____ by _____</p> <p>A</p>
Input	Output				
<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> </tbody> </table> <p>B</p>	Input	Output			<p>_____ ; _____ ; _____</p> <p>Rule = _____ by _____</p> <p>B</p>
Input	Output				
<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> </tbody> </table> <p>C</p>	Input	Output			<p>_____ ; _____ ; _____</p> <p>Rule = _____ by _____</p> <p>C</p>
Input	Output				
<p><u>Solve</u></p> <table border="1"> <thead> <tr> <th>Input</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> </tbody> </table> <p>D</p>	Input	Output			<p>_____ ; _____ ; _____</p> <p>Rule = _____ by _____</p> <p>D</p>
Input	Output				

Pepe's Desserts

Name _____

1. Pepe sells pie at his restaurant. Each pie is cut into 8 slices. Complete the function table to calculate the total number of slices of pie.

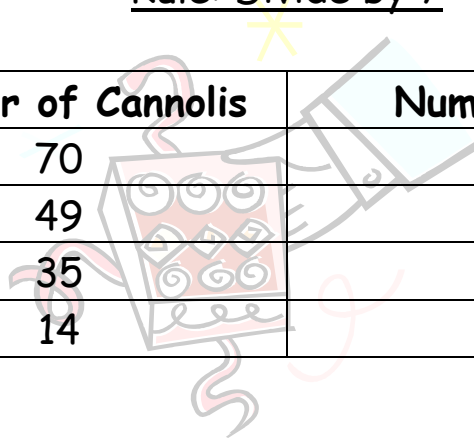
Rule: Multiply by 8



Number of Pies	Slices of Pie
6	
8	
9	
11	

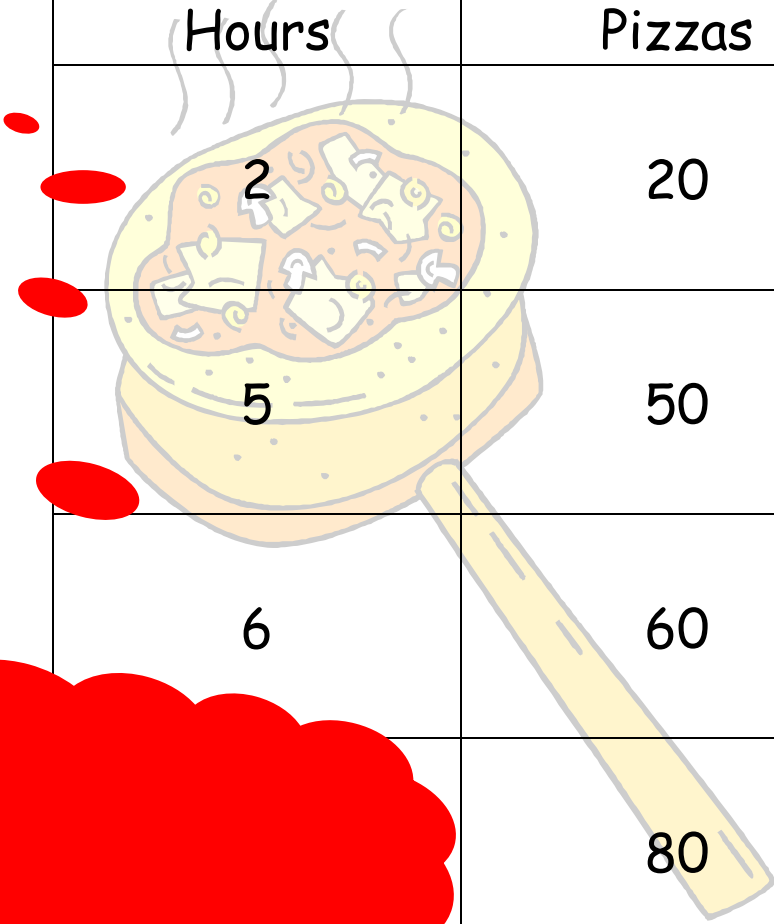
2. Pepe sells his famous homemade cannolis in packages of 7. Help Pepe decide how many boxes he can fill based on the number of cannolis he may have made.

Rule: Divide by 7



Number of Cannolis	Number of Boxes
70	
49	
35	
14	

Time it Takes Pepe to Make Pizzas



Number of Hours	Number of Pizzas
2	20
5	50
6	60
	80
10	100
	140

Directions: Cut on the dotted lines. Fold on the solid line. (Rule: Multiply by 4)

Input	Output
5	20
A	
Input	Output
8	32
A	
Input	Output
	36
A	
Input	Output
11	44
A	

Directions: Cut on the dotted lines. Fold on the solid line. (Rule: Subtract 10)

<p>Input</p> <p>30</p> <p>B</p>	<p>Output</p> <p>20</p>
<p>Input</p> <p>50</p> <p>B</p>	<p>Output</p> <p>40</p>
<p>Input</p> <p>60</p> <p>B</p>	<p>Output</p> <p>50</p>
<p>Input</p>	<p>Output</p> <p>80</p>

Directions: Cut on the dotted lines. Fold on the solid line. (Rule: Add 6)

Input	Output
42	48
Input	Output
51	57
Input	Output
53	59
Input	Output
	68

Directions: Cut on the dotted lines. Fold on the solid line. (Rule: Divide by 2)


Input 4 D	Output 2
Input 10 D	Output 5
Input 6 D	Output 3
Input 18 D	Output 9

Sloppy Sauce Solutions

Name _____


Rule: _____

Rule: _____

Input	Output
12	24
20	40
	80
100	200

Input	Output
17	25
	28
22	30
31	39

Rule: _____

Input	67	84	89	91	
Output	56	73	78	80	82

Rule: _____

Input	55	45		30	15
Output	11	9	7	6	3

Hamburger Heaven Needs Help

Name _____

1.

Number of Hamburgers	Number of Pickles
5	15
10	?
15	45
20	60
25	75

Hamburger Heaven always puts 3 pickles on each hamburger. Complete the function table to find the number of pickles that would be placed on 10 hamburgers.

- Ⓐ 5 Ⓒ 35
Ⓑ 10 Ⓓ 40

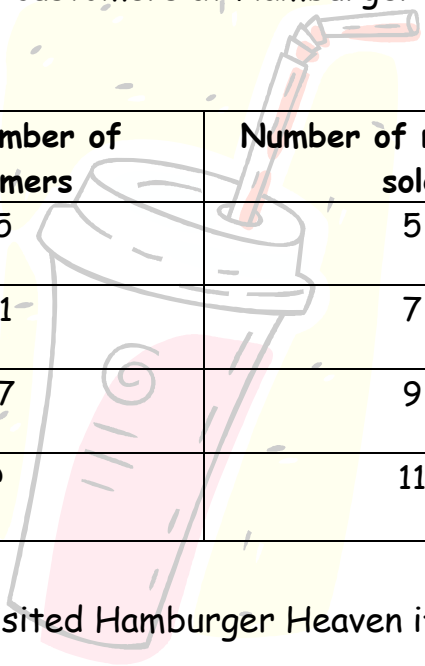
2. Wally the Waiter is folding napkins to set the tables. He recorded the number of napkins needed as he set the tables.

Number of Tables	1	2	3	4
Number of Napkins	4	8	12	16

What is the rule for the function table? _____

Part A

One out of every three customers at Hamburger Heaven orders a milk shake.



Total number of customers	Number of milkshakes sold
15	5
21	7
27	9
?	11

How many customers visited Hamburger Heaven if 11 milkshakes were sold?

Part B

Explain why your answer is correct. Use what you know about function tables in your explanation. Use words, numbers and/or symbols in your explanation.

1.

Input	Output
3	4
5	6
7	8
9	10
11	?

2.

Input	Output
3	1
5	3
6	4
8	?
9	7

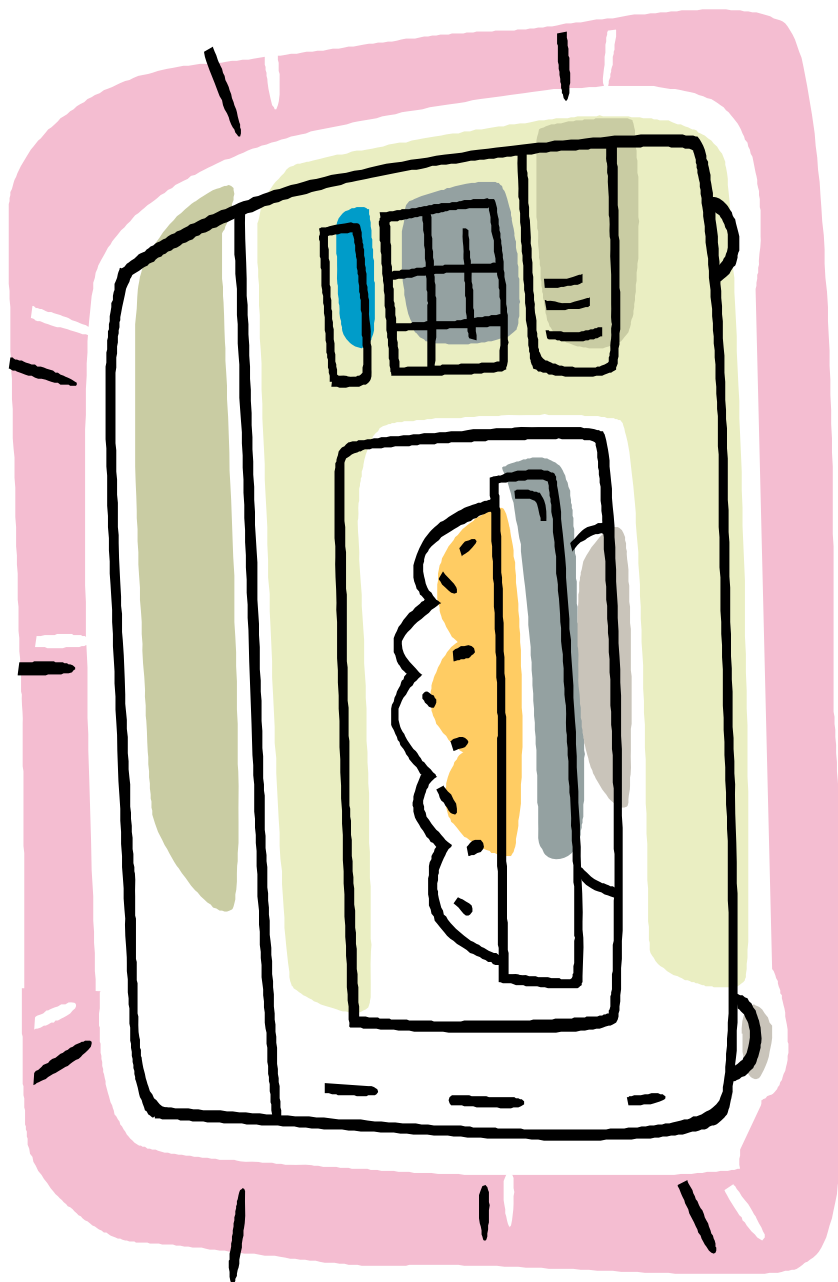
3.

Input	2	3	5	6
Output	6	?	15	18

4.

Input	45	30	25	20
Output	9	6	?	4

“Magic Oven” Function Box Graphic



Pepe Needs Your Help!

Name _____

1. Pepe offers "Five Dollars Off Fridays" for each check total. Calculate the new check totals after the discount is applied on the function table below.

Rule: Subtract 5

Check Total	Check Total with Discount
\$45	\$40
\$51	\$46
\$57	\$52
\$67	\$62

2. Pepe always serves three more breadsticks than the number of customers seated at a table. Calculate the number of breadsticks needed for customers groups on the function table below.

Rule: Add 3

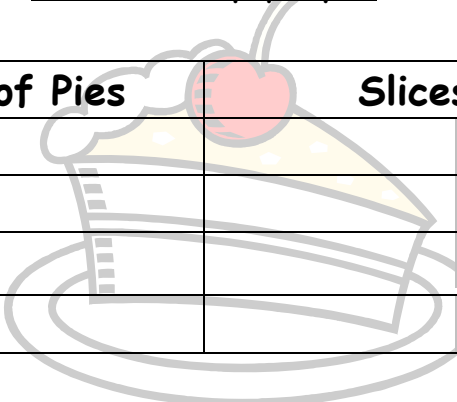
Number of Customers	Number of Breadsticks
7	10
9	12
10	13
13	16

Pepe's Desserts

Name _____

1. Pepe sells pie at his restaurant. Each pie is cut into 8 slices. Complete the function table to calculate the total number of slices of pie.

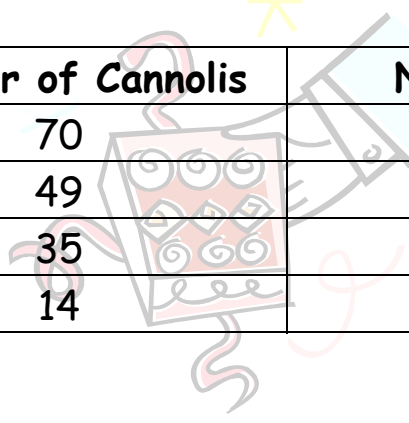
Rule: Multiply by 8



Number of Pies	Slices of Pie
6	48
8	64
9	72
11	88

2. Pepe sells his famous homemade cannolis in packages of 7. Help Pepe decide how many boxes he can fill based on the number of cannolis he may have made.

Rule: Divide by 7




Number of Cannolis	Number of Boxes
70	10
49	7
35	5
14	2

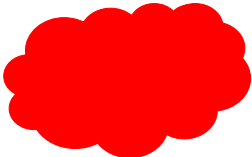
Sloppy Sauce Solutions

Name _____


Rule: _____

Rule: _____


Input	Output
12	24
20	40
 40	80
100	200

Input	Output
17	25
 20	28
22	30
31	39

Rule: _____

Input	67	84	89	91	 73
Output	56	73	78	80	82

Rule: _____

Input	55	45	 35	30	15
Output	11	9	7	6	3

Name _____

Hamburger Heaven Needs Help

1. Hamburger Heaven always puts 3 pickles on each hamburger. Complete the function table to find the number of pickles that would be placed on 10 hamburgers.

Number of Hamburgers	Number of Pickles
5	15
10	?
15	45
20	60
25	75

Ⓐ 5

Ⓑ 10

Ⓒ 30

Ⓓ 45

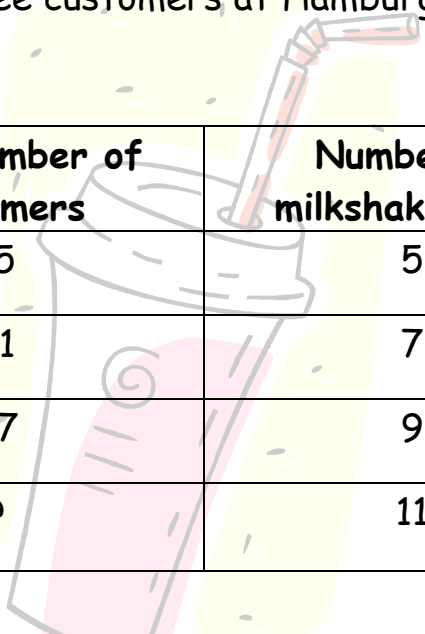
2. Wally the Waiter is folding napkins to set the tables. He recorded the number of napkins needed as he set the tables.

Number of Tables	1	2	3	4
Number of Napkins	4	8	12	16

What is the rule for the function table? multiply by 4

Part A

One out of every three customers at Hamburger Heaven orders a milk shake.



Total number of customers	Number of milkshakes sold
15	5
21	7
27	9
?	11

How many customers visited Hamburger Heaven if 11 milkshakes were sold?

33

Part B

Explain why your answer is correct. Use what you know about function tables in your explanation. Use words, numbers and/or symbols in your explanation.

I know function tables follow a rule to go from the input to the output. The rule for this table is divide by 3. $15 \div 5 = 3$; $21 \div 7 = 3$ $27 \div 9 = 3$. So, I think what number divided by 3 equals 11? $33 \div 3 = 11$